

Water Quality

loadings from all sources increased about 60% during the past century, primarily due to point sources, and total annual nitrogen loading was estimated to have increased about 70%, from both point and nonpoint sources. By contrast, total phosphorus levels in the middle of the Pamlico Estuary have doubled since 1967, with smaller increases both upstream and downstream sections. Nitrogen concentrations are very similar to that of the Neuse. No trend analyses have been performed on other estuaries in the study area. It is recommended that a long-term trend analysis be completed for the Albemarle Sound area.

10. Bottom water dissolved oxygen concentration is controlled primarily by climatic and hydrologic factors in the Pamlico River Estuary, the only area where studies have been conducted. There has been no trend toward lower dissolved oxygen concentrations over the past 17 years of record. Low bottom water oxygen (hypoxia) does not occur in the estuary when water temperatures are lower than about 20°C. Above 20°C, dissolved oxygen values of less than 1 mg/liter were found in about 20% of the samples from the upper estuary, but in only 4% of the samples from the lower estuary. Salinity stratification prevents mixing of the bottom water with surface water, which prevents aeration of the bottom water leading to hypoxia. Hypoxia can become established in a short period of time during summer; and, conversely, can be dissipated very quickly if mixing occurs. A monitoring program needs to be established to provide more consistent data upon which to model hypoxia.
11. There is little or no evidence to support the hypothesis that the Albemarle-Pamlico estuarine sediments are qualitatively much different today than they were in past centuries, nor is there evidence that they are functionally different. Anoxic and other adverse water quality episodes have probably been common in past decades as they are today. However, long-term data upon which to base arguments regarding changes and trends in sediment characteristics and subsequent water quality impacts simply are not available.
12. A model needs to be developed to consider all factors which affect water quality. Although sediment-water exchanges are important to nutrient cycling and metal storage in estuaries, these exchanges are only one flux that dominates cycling in certain places at certain times—there are many others. A multidisciplinary approach to the physical, chemical and biological interaction of inputs and interactions is the only way that the total picture can be determined.